

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

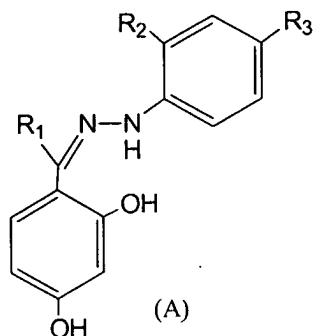
Listing of Claims:

Claims 1-33 (canceled).

Claim 34 (Withdrawn): Nitrogen-oxygen-carbon polymers obtained by condensation of a 4-{1-[(2,4-di(substituted)-phenyl)-hydrazono]-alkyl}-benzene-1,3-diol with a phenol or a 3-substituted phenol or a 3,5-disubstituted phenol and formaldehyde or paraformaldehyde in the presence of either a basic (e.g. NaOH) or acid (e.g. HCl) catalyst in water/alcohol mixtures as solvent and at a temperature comprised between 20-150°C and having an average molecular weight comprised between 1000 and 50000, with the proviso that the 3-substituted phenol can not be resorcinol.

Claim 35 (Withdrawn): Polymers according to claim 34 wherein the 4-{1-[(2,4-di(substituted)-phenyl)-hydrazono]-alkyl}-benzene-1,3-diol is a compound of formula

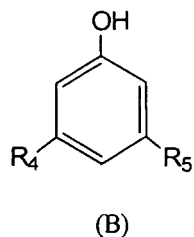
(A):



wherein R_1 is chosen in the group consisting of: hydrogen and a hydrocarbon radical, having from 1 to 10 carbon atoms, possibly halogenated;

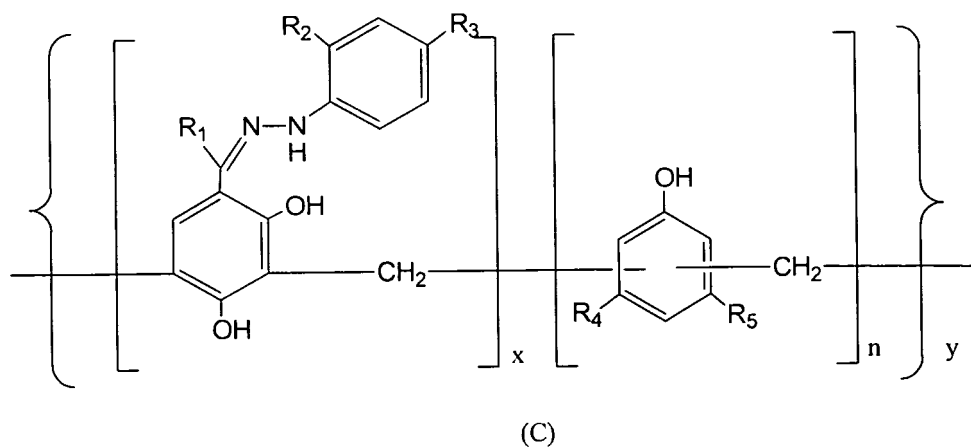
R_2 and R_3 each independently represent an electron-withdrawing group selected in the group consisting of hydrogen, halogen, acyl, ester, carboxylic acid, formyl, nitrile, sulphonic acid, linear or branched alkyl or aryl groups, having from 1 to 15 carbon atoms, optionally functionalised with halogens or joined to each other to form one or more condensed cycles with the phenyl ring, and nitro groups.

Claim 36 (Withdrawn): Polymer according to claim 34 wherein the 3,5-disubstituted phenol is a compound of formula (B):



wherein R_4 and R_5 each independently represent an electron-donating group selected in the group consisting of hydrogen, hydroxyl, ether, amines, aryl and linear and branched alkyl groups, having from 1 to 15 carbon atoms, with the proviso that the 3-substituted phenol can not be resorcinol.

Claim 37 (Withdrawn): Polymers according to Claim 36 having general formula (C)



wherein y can vary from 2 to 120, x can vary between 1 and 2, n can vary between 1 and 3 and R_1 , R_2 , R_3 , R_4 and R_5 are as above defined.

Claim 38 (Withdrawn): Metal complexes consisting of a polymer according to Claim 34 and a metal salt.

Claim 39 (Withdrawn): Metal complexes according to Claim 38 wherein the metal salt is chosen in the group consisting of iron-, cobalt- and nickel-carboxylates, -halides, -alcoholates, -acetylacetonates, -formates, -oxalates, -malonates, and analogous organic salts and mixtures thereof or -carbonates, -oxides and -bicarbonates, and mixtures thereof.

Claim 40 (Withdrawn): Complexes according to Claim 39 chosen in the group consisting of: Fe-, Co- and Ni-acetates (and mixture thereof).

Claim 41 (Withdrawn): Catalysts consisting of the complexes according to claim 38 wherein the metal is reduced either in the solid state with H_2 or in fluid solution systems with appropriate reducing agents.

Claim 42 (Withdrawn): Catalysts consisting of the complexes

according to claim 38 wherein the said metal complexes are pyrolysed at a temperature between 500 and 1000 °C, preferentially 800 °C, under inert gas protection (for example N₂, Ar) for about 2 hours.

Claim 43 (Previously Presented): Electrodes (anodes and cathodes) consisting of the catalysts according to Claim 41 and a suitable conductive support.

Claim 44 (Previously Presented): Anodes consisting of the catalysts according to Claim 41 and comprising binary or ternary combinations of Fe, Co and Ni and a suitable conductive support.

Claim 45 (Previously Presented): Cathodes consisting of the catalysts according to Claim 41 and comprising Ni or Co and a suitable conductive support.

Claim 46 (Withdrawn): A process for preparing a nitrogen-oxygen-carbon polymer according to Claim 34 wherein said reaction is carried out by condensation of a 4-{1-[(2,4-di(substituted)-phenyl)-hydrazono]-alkyl}-benzene-1,3-diol with a 3,5-disubstituted phenol and formaldehyde or paraformaldehyde in the presence of a basic catalysts.

Claim 47 (Withdrawn): A process according to claim 46 wherein said reaction is carried out in the presence of an acid catalyst.

Claim 48 (Withdrawn): A process according to claim 46 wherein said reaction is carried out in the temperature range from about 20 to about 150 °C and in the pH range from about 1 to about 14.

Claim 49 (Withdrawn): A process according to claim 46 wherein said reaction is carried out in either a one-pot or cascade procedure using as separated components a 4-acyl/formyl-benzene-1,3-diol, a 2,4-disubstituted phenylhydrazine, a 3,5-disubstituted phenol and formaldehyde or paraformaldehyde.

Claim 50 (Withdrawn): A process for preparing a complex according to claim 38 by dissolving a polymer according to Claim 34 and one or more salts in an appropriate solvent or mixture of solvents, preferentially acetone, in the temperature range from about 20 °C to about 60 °C and submitting the obtained product to reduction..

Claim 51 (Withdrawn): A process according to Claim 50 wherein a mixture of metal salts chosen in the group consisting of

nickel(II), iron(II) and cobalt(II) salts, alone or in binary or ternary combinations in a preferred stoichiometric ratio is used.

Claim 52 (Withdrawn): A process according to Claim 51 wherein the metal(s) loadings are in the range of about 0.5 % to about 10 % of the total elements plus metal weight.

Claim 53 (Withdrawn): A process according to Claim 50 wherein the reduction step is performed with a flow of H_2 at a temperature between 350 °C and 400 °C for 1-2 hours.

Claim 54 (Withdrawn): A process according to Claim 50 wherein the reduction step is performed on the complex dispersed in a solvent, with an aqueous solution of hydrazine, or a solution of a tetrahydroborate salt $[Y]BH_4$, wherein Y is Li^+ , Na^+ , K^+ , NR_4^+ , PPN^+ and R_4 is as defined in Claim 36 and PPN^+ is bis(triphenylphosphoranylidene)ammonium, at a temperature between 0 °C and 20 °C for 30 minutes-1 hour.

Claim 55 (Withdrawn): A process for preparing a catalyst according to Claim 41 wherein the metal-doped polymers P-M are pyrolysed at temperatures ranging from 500 to 1000 °C under inert gas protection (for example N_2 , Ar) for 1-2 hours.

Claim 56 (Withdrawn): A process for preparing an electrode according to Claim 43 in the form of anode for fuel cells, involving mixing together the metal doped polymer materials and either a porous carbon support material or other conductive support materials prior to the reduction treatment according to Claim 53.

Claim 57 (Withdrawn): A process according to Claim 56 wherein a single metal or a binary or ternary combinations of nickel, iron and cobalt in a preferred stoichiometric ratio, with metal loadings in the range of about 0.5 % to about 10 % of the total elements plus metal weight are used.

Claim 58 (Withdrawn): A process for preparing an electrode according to Claim 43 in the form of alcohol-tolerant cathodes for fuel cells, comprising mixing together the metal doped polymer and either a porous carbon support material or other conductive support materials prior to heat-treatment at temperatures ranging from about 500 °C to about 1000 °C under inert gas protection (for example N₂, Ar) for 1-2 hours.

Claim 59 (Withdrawn): A process according to Claim 58 wherein

the metal doped polymer contains a metal or a mixture of metals with metal loadings in the range of about 0.5 % to about 10 % of the total carbon plus metal weight.

Claim 60 (Withdrawn): Anodes for Direct Oxidation Fuel cells (DOFC) or Direct Alcohol Fuel Cells (DAFC), formed with a catalysed carbon substrate according to Claim 56 containing metals chosen in the group consisting of iron, cobalt and nickel.

Claim 61 (Withdrawn): Alcohol-tolerant cathodes for Direct Oxidation Fuel cells (DOFC), or Direct Alcohol Fuel Cells (DAFC), formed with a catalysed carbon substrate according to Claim 58, containing nickel.

Claim 62 (Previously Presented): Direct Oxidation Fuel Cells (DOFC) or Direct Alcohol Fuel Cells (DAFC) comprising an anode and a cathode according to claim 44 and a solid electrolyte membrane, either anionic or cationic, capable of producing open circuit voltages (OCV) as high as 1.13 V and powers as high as 160 mW/cm² at ambient temperature and pressure.

Claim 63 (Previously Presented): Polymer Electrolyte Fuel Cells (PEFC) fuelled with H₂ comprising an anode catalysed with

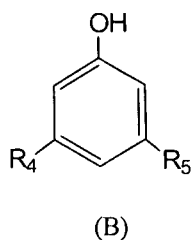
iron, cobalt and nickel in a stoichiometric ratio with an overall metal loading between 0.5 and 8% wt according to Claim 44 capable of producing open circuit voltages (OCV) as high as 1.18 V and power densities as high as 300 mW/cm², in conjunction with a cathode of the present invention or a cathode of the state of the art and a solid electrolyte membrane of the state of art.

Claim 64 (Previously Presented): Polymer Electrolyte Fuel Cells (PEFC) fuelled with H₂ comprising a cathode catalysed by nickel in loadings between 0.5 -7% wt according to Claim 45 capable of producing open circuit voltages (OCV) as high as 1.18 V and power densities as high as 300 mW/cm² in conjunction with an anode of the present invention or an anode of the state of the art and a solid electrolyte membrane of the state of art.

Claim 65 (Previously Presented): Fuel cells comprising electrodes according to claim 43.

Claim 66 (New): Electrodes (anodes and cathodes) consisting of catalysts and a suitable conductive support, wherein the catalysts consist of metal complexes consisting of a polymer and a metal salt, wherein the metal is reduced either in the solid state with H₂ or in fluid solution systems with appropriate reducing

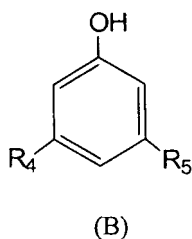
agents, and wherein the polymer is a nitrogen-oxygen-carbon polymer obtained by condensation of a 4-{1-[(2,4-di(substituted)-phenyl)-hydrazono]-alkyl}-benzene-1,3-diol with a phenol or a 3-substituted phenol or a 3,5-disubstituted phenol and formaldehyde or paraformaldehyde in the presence of either a basic (e.g. NaOH) or acid (e.g. HCl) catalyst in water/alcohol mixtures as solvent and at a temperature between 20-150°C and having an average molecular weight between 1000 and 50000, wherein the 3,5-disubstituted phenol is a compound of formula (B):



wherein R_4 and R_5 each independently represent an electron-donating group selected in the group consisting of ether, amines, aryl and linear and branched alkyl groups, having from 1 to 15 carbon atoms.

Claim 67 (New): Anodes consisting of catalysts and comprising binary or ternary combinations of Fe, Co and Ni and a suitable

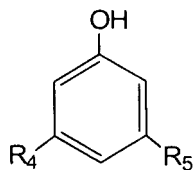
conductive support, wherein the catalysts consist of metal complexes consisting of a polymer and a metal salt, wherein the metal is reduced either in the solid state with H_2 or in fluid solution systems with appropriate reducing agents, and wherein the polymer is a nitrogen-oxygen-carbon polymer obtained by condensation of a 4-{1-[(2,4-di(substituted)-phenyl)-hydrazono]-alkyl}-benzene-1,3-diol with a phenol or a 3-substituted phenol or a 3,5-disubstituted phenol and formaldehyde or paraformaldehyde in the presence of either a basic (e.g. NaOH) or acid (e.g. HCl) catalyst in water/alcohol mixtures as solvent and at a temperature between 20-150°C and having an average molecular weight between 1000 and 50000, wherein the 3,5-disubstituted phenol is a compound of formula (B):



wherein R_4 and R_5 each independently represent an electron-donating group selected in the group consisting of ether, amines,

aryl and linear and branched alkyl groups, having from 1 to 15 carbon atoms.

Claim 68 (New): Cathodes consisting of catalysts and comprising Ni or Co and a suitable conductive support, wherein the catalysts consist of metal complexes consisting of a polymer and a metal salt, wherein the metal is reduced either in the solid state with H_2 or in fluid solution systems with appropriate reducing agents, and wherein the polymer is a nitrogen-oxygen-carbon polymer obtained by condensation of a 4-{1-[(2,4-di(substituted)-phenyl)-hydrazono]-alkyl}-benzene-1,3-diol with a phenol or a 3-substituted phenol or a 3,5-disubstituted phenol and formaldehyde or paraformaldehyde in the presence of either a basic (e.g. NaOH) or acid (e.g. HCl) catalyst in water/alcohol mixtures as solvent and at a temperature between 20-150°C and having an average molecular weight between 1000 and 50000, wherein the 3,5-disubstituted phenol is a compound of formula (B):



(B)

wherein R_4 and R_5 each independently represent an electron-donating group selected in the group consisting of ether, amines, aryl and linear and branched alkyl groups, having from 1 to 15 carbon atoms.